

The Effect of Puberty on Effectiveness of Corrective Exercise on School Girls

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Article information	Abstract
<p>Article history: Received: 18 Apr 2012 Accepted: 25 June 2012 Available online: 7 Jan 2013 ZJRMS 2014; 16(6): 83-84</p> <p>Keywords: Spinal abnormality Puberty Exercise therapy</p>	<p>Background: An investigation of puberty on corrective exercise effectiveness on school girls.</p> <p>Materials and Methods: 64 lumbar lordotic school girls were included (10 and 17 years old) that randomly divided into two groups: experimental (32 persons) and control (32 persons). The experimental groups performed corrective exercise for 8 weeks. Lumbar curved was measured by flexible ruler. Two way ANOVA test was applied on the data.</p> <p>Results: The corrective exercise reduced lumbar curve of prepubertal and pubertal girls ($p < 0.05$).</p> <p>Conclusion: Corrective exercises had significant effect on increased lumbar lordosis specially after puberty.</p>

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Introduction

Lumbar lordosis exposed numerous deformities. One of the important complications is increased lumbar lordosis. There are intrinsic and extrinsic factors that can influence lumbar lordosis such as heredity, environment, physical conditions, level of physical activity age, sex and, skeletal maturity [1]. Puberty is periods of life when posture undergoes many adjustments and adaptations [1] due to changes in the body, vertebral anatomical dimensions, body height, and hormonal status. Postural changes cause deformity in children and adolescence's posture, if improvement is not done, then the structural changes occur [2]. Penha et al. reported some postural abnormalities reflect normal postural development, and are corrected by the child's growth [1]. Fanuchi et al. confirmed Espinoza-Navarro et al. who reported implementation of exercise program decline rates of postural abnormalities in 4 year old children and regular involvement in specific exercise programs during childhood could promote optimal spinal alignment and tissue load during growth spurt [3, 4]. Hasanvand et al. reported, corrective exercises can begin with the onset of puberty [5]. Growth spurt is appropriate time to enhance bone because the serum levels of sex hormones increase progressively during puberty then strength begins to plateau in post pubertal girls. Lumbar lordosis deformity grow up dramatically in pre pubertal and pubertal girls and there is limited evidence about effect of puberty and corrective exercise. Therefore the research question for this study was: how much is the effect of puberty on effectiveness of corrective exercise on school girls.

Materials and Methods

This study was experimental. In this study, all 17 year old (1042 patients) and 10 year old students (1084 people) 12th educational region of Tehran were evaluated based

on initial screening. The target populations were 64 school girls that they had hyper lumbar lordosis. The sample populations were composed of children and adolescences of public schools in the city of Tehran, Iran (10 year old girls were in tanner stage of 1, 2 and 17 year old girls were in tanner stage of 4, 5) The children and adolescences were randomly assigned to either the control group or the experimental group. Lumbar lordosis was measured in standing position with flexible ruler before and after corrective exercise program. Lumbar lordosis is defined by the angle between the T₁₂ thoracic vertebrae and S₂ sacral vertebrae. Training program included hip flexor and trunk extensor stretching and hip extensor and trunk flexor strengthen. Experimental groups performed 8 weeks and three times a week training program. Each stretching exercise was performed 5 min at the first session until 15 min at the 24th session. The strength exercises was performed with 3 sets of 8 repetitions with training intensities 60% of 1 RM at the first session until 3 sets of 12 repetitions with training intensities 100 of 1 RM at the end of 8 weeks. A two-way ANOVA was used to compare the study groups at baseline and 0.05 level of significance was applied to all statistical analysis. Data analysis with SPSS-16 Kolmogorov-Smirnov test was used for normal distribution of data and Levon test confirmed the homogeneity of variance.

Results

The mean age, weight and height in two control and experimental groups were 10.62±0.12 year, 17.06±0.44 year and 36.75±5.61 Kg, 52.46±6.13 Kg and 1.38±6.65 cm, 1.68±5.57 cm respectively. Lumbar lordosis decreased significantly in 10 and 17 year old girls ($p=0.0001$). But in control group no changes in these parameters have been observed. Toukey's result showed

no significant difference between pre and post pubertal experimental groups, and also there was no significant difference in the interaction effect of independent variable (corrective exercise and puberty) and dependent variable (groups).

Discussion

The results of this study show that this program decrease lumbar lordosis of 10 and 17 year old school girls but there were no statistically significant differences between the pre pubertal and pubertal groups before and after intervention. Hasanvand et al. reported the corrective exercises can perform at the onset of puberty [5]. The optimum time of corrective exercise effectiveness has been always in the center of researchers' attention. So that Funuuchi et al. believed that specific exercise programs during childhood could promote optimal spinal alignment and tissue load [3]. These results are in agreement with Espinoza-Navarro and Fanucchi [3,4].

This researcher reported that corrective exercise program that includes strength training and stretching exercises have a significant effect on lumbar lordosis reduction. Zakas reported stretching program significantly increases the flexibility of the lower extremities in pre pubertal, pubertal and adolescent and believed that improvements in flexibility after the training program are not affected by age factors [6]. Researchers believed strengthening exercises is a part of corrective exercise that can enhance the muscular strength of children and adolescents beyond that which is normally due to growth and development. It appears that training-induced strength gains are more related to neural mechanisms than

hypertrophic factors in children [7]. The effect size of this study was $d=0.533$ for pre adolescence and $d=0.733$ for adolescence. These results are in a good agreement with Payne et al. performed for the children between 6 and 18 years with effect size between 0.65 to 0.83. This finding is related to neuromuscular, hormonal and motor coordination factors [8]. Effect size showed adolescent had better performance but it does not means children should not participate in corrective exercise. It is shown that after puberty is appropriate time to perform corrective exercise. Limitation of this study was included lack of cooperation of majority of participants and it was not feasible to investigate maintenance of training in long term.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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